LADYZHENSKIY, M., inzhener-kapitan 3-go ranga

Training apparatus in rocket units. Voen. vest. 41 no.5: 120-122 My '61. (MIRA 14:8)
(Rockets (Ordnance))--Study and teaching)

[illegible]

[illegible]ntactless logical elements in ship automation. Rech. transp. [illegible] no.6:31-32 '65. (MIRA 18:8)

APPROVED FOR RELEASE: 06/20/2000 CIA-RDP86-00513R000928420007-9"

PA - 2204

AUTHOR LADYZHENSKIY, M.D.

TITLE Damping of Shock Waves (Zatukhaniye udarnykh voln).

PERIODICAL Prikladnaia Matematika i Mekhanika, 1957, Vol 21, Nr 1, pp 27-34(U.S.S.R.)

Received 3/1957 Reviewed 5/1957

ABSTRACT The method used here for the investigation of the asymptotic behavior of shock waves differs from the methods employed in the works carried out by L.D.LANDAU, G.B.WHITHAM, and L.I.SEDOV. By means of the here suggested method not only the dependence of the intensity of the shock wave on the distance up to the place of their occurrence, but also the dependence of such quantities can be determined as characterize the initial disturbance. Furthermore, this method permits the simple investigation of the asymptotic laws of damping of wave packets.

At first the shock waves are investigated at a great distance from the profile and from the rotation body. The plane and the axially-symmetric case are investigated simultaneously. Here the gas is supposed to flow along an infinite solid wall which, with the exception of an arc, is parallel to the x-axis, with supersonic velocity. A PRANDTL-MEYER flow with an inaccuracy of up to terms of the third order is realized behind the shock wave. The equations for the line of the shock wave are derived. The equation of the shock wave is written down in polar coordinates. Decrease of pressure on the shock wave is expressed by means of the wave resistance of the rotation body. Next, the general formulae for the determination of the intensity of the shock wave at the head and the tail of the body of rotation are derived. In conclusion, a further formula

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Damping of Shock Waves.

for the distance between the shock waves at the head and the tail is written down.
The second chapter deals with the shock waves in the case of a non-steady motion. The onedimensional, cylindrical and spherically-symmetric shock waves are here dealt with simultaneously. The author here determines the law of motion of the frontal shock wave. (For the rear shock wave everything is obtained in an analogous manner.)
In conclusion the asymptotic behavior of the wave packets is studied. At first the damping of a shock wave is investigated which propagates between two centered thinning waves in a plane or axially-symmetric flow which has become steady. In the most general case the wave packet which consists of a finite number of shock waves, splits up at a sufficiently great distance into a head- and tail wave which are separated by a condensating wave. Thus, only two waves can exist within great distances of bodies of any size. (6 illustrations)

ASSOCIATION Not given
PRESENTED BY
SUBMITTED 17. 7. 1956
AVAILABLE Library of Congress

LADYZHENSKIY, M. D. (Moscow)

"On Some Magnetogasdynamic Effects in Aerodynamics."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

31505 S/020/60/134/002/002/025
B104/B201

10.1230
11.7430

AUTHOR: Ladyzhenskiy, M. D.

TITLE: Gas flows with high supersonic velocity

PERIODICAL: Doklady Akademii nauk SSSR, v. 134, no. 2, 1960, 296-299

TEXT: A study has been made of the flow equations for high supersonic velocities, which are simplified as a function of the flow parameter K. For K~1 it is possible to use the equations of the perturbation theory of hypersonic flows for the case of flows around thin bodies. For K~1 a solution of the Cauchy problem is obtained, that is of interest for the study of inner flows. In the first part of the paper, the author examines the steady flow of an ideal gas with a constant drag enthalpy. For planar ($\nu = 0$) and axially symmetric ($\nu = 1$) flows, the equation of continuity, the momentum equation, and the adiabatic equation are written as

$$\frac{1}{\varkappa-1}\frac{\partial \ln\eta}{\partial\tau}+\frac{\partial\theta}{\partial n}+\nu\frac{\sin\theta}{y}=0,\quad \frac{\partial\theta}{\partial\tau}+\frac{\partial\eta}{\partial n}-\eta\frac{\partial\sigma}{\partial n}=0,\quad \frac{\partial\sigma}{\partial\tau}=0, \qquad (2).$$

The characteristic equations and the exact elementary solutions of (2) read

Card 1/4

$$dy - \operatorname{tg}(\theta \pm \psi)\,dx = 0, \qquad \operatorname{tg}^2\psi = (\varkappa - 1)\,\eta,$$

$$\pm d\theta + \frac{2}{\sqrt{\varkappa-1}}\,d\sqrt{\eta} + \nu\frac{\sin\theta\sin\psi}{\sin(\theta\pm\psi)}\,\frac{dy}{y} - \frac{\operatorname{tg}\psi}{\varkappa-1}\,d\sigma = 0, \qquad (4),$$

$$y = x\operatorname{tg}(\theta\pm\psi) + Y(\theta), \qquad \theta \mp \frac{2\sqrt{\eta}}{\sqrt{\varkappa-1}} = \text{const}, \qquad (5).$$

Here, ψ denotes the Mach angle, $Y(\theta)$ is an arbitrary function, and $\eta_r = \frac{(\varkappa-1)(1+\nu)}{2}$ = const the source power (with σ = const). For the purpose of evaluating the terms of equations (2), the characteristic quantities Δ and ϑ are introduced for η and θ, respectively.

$$\frac{\Delta}{T\vartheta} : \frac{\vartheta}{T} = \frac{\Delta}{\vartheta^2} \sim \frac{1}{M^2\vartheta^2} = \frac{1}{K^2}. \qquad (9)$$

is obtained, where N and T are characteristic dimensions which, in the flow region concerned, refer to the directions along the flow lines and perpendicular thereto. For $K \sim 1$, the flow around a thin body is examined by a hypersonic flow. The equation holding in this case is shown to be:

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Gas flows ...

$$\frac{\partial}{\partial\tau}=[1+O(\vartheta^2)]\left(\frac{\partial}{\partial x}+\vartheta\frac{\partial}{\partial y}\right),\quad \frac{\partial}{\partial n}=[1+O(\vartheta^2)]\frac{\partial}{\partial y}. \qquad (10).$$

The equations (2) can then be written in the form of equations for unsteady flows. For $K\gg 1$ the Cauchy problem is studied, and solution

$$\eta=\eta_0\left[\left(\frac{r_0}{r}\right)^{\varkappa-1}\left|\frac{r_0\pm a}{r\pm a}\right|^{\nu(\varkappa-1)}\right],\quad \vartheta=\vartheta_0,\quad \sigma=\sigma_0, \qquad (12)$$

is obtained. This solution fully fits the solution for hypersonic sources in the case of $\nu = 0$, and for $\nu = 1$ if $r\gg a$. This substantiates the correctness of the asymptotic solutions obtained by the author in a previous investigation (Tr. TsAGI, v. 779 (1960)) concerning the outflow of a gas jet into the vacuum. (12) is manifestly correct for a small ν. In the final part the author examines the domains of definition of the solution. He proves the existence of infinite domains of definition of the solution, which is in connection with the parabolic degeneracy of the equations considered for the case in which M tends to infinity. A. A. Nikol'skiy is thanked for valuable advice. There are 3 figures and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc.

Card 3/4

31505
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B104/B201

Gas flows ...

PRESENTED: April 27, 1960, by A. A. Dorodnitsyn, Academician

SUBMITTED: April 22, 1960

Card 4/4

LADYZHENSKIY, M. D.

Cand Phys-Math Sci - (diss) "Several problems in gas dynamics of hypersonic flows." Moscow, 1961. 12 pp; (Inst of Mechanics of the Academy of Sciences USSR); 130 copies; price not given; bibliography on pp 11-12 (21 entries); (KL, 6-61 sup, 194)

LADYZHENSKIY, M.D. (Moskva)

Hypersonic flow past slender blunt bodies. Izv. AN SSSR. Otd. tekh.nauk.Mekh. i mashinostr. no. 1:150-151 Ja-F '61. (MIRA 14:2)

(Aerodynamics, Hypersonic)

34329

S/124/62/000/002/003/014
D234/D302

10.1200

AUTHOR: Ladyzhenskiy, M.D.

TITLE: Supersonic rule of areas

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 2, 1962, 22, abstract 2B125 (Inzhenernyy zh., l., no. 1, 1961, 159-163)

TEXT: The author establishes the limits of applicability and gives an improvement of the supersonic rule of areas proposed by himself in a previous work (Izv. AN SSSR Otd. tekhn. n. Mekhan. i mashinostr., 1961, no. 1, 150-151 - RzhMekh. 1961. 11B131). To estimate the limits of applicability of the rule, the limitations formulated previously in a general form (the body must not pass the limits of the shock wave produced by the equivalent axially symmetrical body, the resistance of the blunt part must not exceed essentially the resistance of the remaining part of the body) are illustrated by calculating a specific example of the family of blunt elliptic cones. The improvement of the rule of areas is attained by considering the relations and estimating the orders of

Card 1/2

Supersonic rule of areas

magnitude of the parameters in the entropy layer. A schematization of the phenomenon, more subtle than the initial assumption that the whole mass of gas is concentrated in the shock wave, reduces essentially the limits of applicability of the rule of areas. The requirement of equality of resistance of the blunt parts is replaced by the requirement that nose parts of the bodies at a certain distance from the front point should coincide (and consequently, be axially symmetrical). The body in this case must not pass outside the limits of the entropy layer instead of those of the shock wave as in the previous investigation. [Abstracter's note: Complete translation].

Card 2/2

10,1220

28973
S/179/61/000/003/016/016
E191/E435

AUTHOR: Ladyzhenskiy, M.D. (Moscow)

TITLE: Generalization of the hypersonic law of areas

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, 1961, No.3, pp.188-189

TEXT: A generalization of the hypersonic law of areas is given for the case when the body extends beyond the limits of the region bounded by the surface of the shock wave. The problem of flow is reduced to the equivalent problem of the non-stationary motion of a gas displaced by a piston. An analytical discussion leads to the following formulation of the generalized rule of areas in hypersonic flow around thin blunt bodies. For two blunt bodies with equal values of bluntness drag, which have equal parts emerging outside the limits of a circle (also called "Newton edges") and equal laws of variation of areas contained within the same circle, the laws of pressure variation and the motion of the shock waves in regions where the compressed layer does not adhere to the body are identical. The surface of the shock wave in these regions retains axial symmetry. It follows that the total drag values

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of the two bodies are equal inasmuch as these drag forces are composed of three components, namely the forces acting on the Newton edges, the forces acting on bodies inside the circle, and the concentrated forces. Acknowledgments are expressed to M.N.Kogan. There are 2 figures and 4 references: 3 Soviet and 1 non-Soviet. The reference to an English language publication reads as follows: Hayes W.D., Newtonian flow theory in hypersonic aerodynamics. Proc. of the First Int. Congress in the Aeronaut. Sci. Pergamon Press, 1959.

SUBMITTED: January 18, 1961

X

Card 2/2

LADYZHENSKIY, M.D. (Moskva)

Some integrals of transonic gas-flow equations. Inzh.zhur.2 no.1: 6-10 '62. (MIRA 15:3)

(Aerodynamics, Transonic)

BOGACHEVA, A.A. (Moskva); LADYZHENSKIY, M.D. (Moskva)

Hypersonic flow about slender blunt elliptic cones. Inzh.zhur. 2 no.3:14-20 '62. (MIRA 15:8)
(Aerodynamics, Hypersonic)

L 16719-63 EPR/EPA(b)/EWP(k)/EWT(1)/EPF(n)-2/BDS/T-2 AFFTC/ASD/ESD-3/AFWL/
IJP(C)/SSD Ps-4/Pd-4/Pf-4/Pu-4 WW/EH S/124/63/000/004/005/064

AUTHOR: Ladyzhenskiy, M. D.

82

TITLE: [redacted] Magnetohydrodynamic flow at low R sub m-values

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 4, 1963, 2, abstract 4B12 (Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy, v. 2, Riga, AN LatvSSR, 1962, 215-220)

TEXT: Magnetohydrodynamic equations are written, describing in cyclindrical coordinates (x, y) an axially-symmetric or plane steady flow of a nonviscous gas in the presence of a magnetic field. It is demonstrated that if the magnetic Reynolds number is small, and the assigned magnetic field H has a characteristic in the origin of coordinates of the form:

$$H = \frac{1}{V_\infty} \Phi\left(\frac{y}{x}\right)$$

(direction of x-axis coincides with direction of velocity of incident flow), the equations of motion then admit a class of self-reproducing solutions in which the pressure, density Rho and the velocity vector depend on Zeta = x/y. Specifically, a study is made of the problem of flow around a semi-infinite plate by a supersonic gas in a direction perpendicular to the plate's leading edge, in the presence,

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L 16719-63

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Magnetohydrodynamic flow at .....

within the plate, of surface currents directed perpendicularly to the flow plane and having the following distribution of current density j = - A/square root of x (subscript after "x" illegible). The following is hypothesized: 1. the magnetic field being formed by such currents creates an abrupt density jump, originating from the plate's leading edge and 2. prior to the jump, the gas is not electrically conductive. In this case, the flow falls in the class of self-reproducing solutions and is described by three conventional differential equations relative to Rho and the velocity components u and v. A preliminary analysis of these equations is made. A solution is obtained describing the gas flow near a plate's surface. V. M.Kuptsov.

[Abstracter's note: Complete translation.]

Card 2/2

36038
S/040/62/026/002/010/025
D299/D301

10,1200
24.4300

AUTHOR: Ladyzhenskiy, M.D. (Moscow)

TITLE: Analysis of hypersonic-flow equations and solution of Cauchy's problem

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 2, 1962, 289 - 299

TEXT: The general hypersonic-flow equations are analyzed. It is noted that the solution to Cauchy's problem contains infinite domains of existence of the solution. The obtained approximate solutions to Cauchy's problem are compared with exact analytic- and numerical solutions. After simplifying the iso-energetic flow equations, one obtains

$$\frac{1}{\varkappa - 1}\frac{\partial \ln \eta}{\partial s} + \operatorname{div} \tau = 0, \qquad \tau = 1 \tag{1.5}$$

$$-\tau\frac{\partial \tau}{\partial s} + \operatorname{grad} \eta \equiv \operatorname{grad}_n \eta = \eta \operatorname{grad} \sigma - \frac{\partial \tau}{\partial s}$$

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Analysis of hypersonic-flow ...

For plane- and axisymmetric flows, the properties of the solution to Eq. (1.5) are mainly determined by the parameter K which is the product of M_* by ϑ (which characterizes the range of variation of the velocity-vector inclination). With $K \gg 1$, the solution to Cauchy's problem is obtained: $K \gg 1$ involves the fulfilment of the conditions

$$|\theta(A) - \theta(B)| \gg \sqrt{\max \eta}, \quad \chi - \Psi > 0 \quad (\Psi = \operatorname{arc\,tg}[(\varkappa - 1)\eta]^{1/2}) \tag{2.1}$$

on the smooth arc AB (shown in a figure); $\max \eta$ denotes the maximum value of η on AB; θ is the angle of inclination of the velocity vector; χ is the sharp angle between the velocity vector and the tangent to AB; Ψ is the Mach angle. The solution to Cauchy's problem is

$$\eta = \eta_0 \left|\frac{r_0}{r}\right|^{\varkappa-1} \left|\frac{r_0 + a}{r + a}\right|^{\nu(\varkappa-1)} \qquad \theta = \theta_0, \quad \sigma = \sigma_0. \tag{2.2}$$

This solution applies to both steady- and unsteady gas flow. It coincides with the asymptotic solution (obtained in an earlier investigation by the author and V.N. Guseva) to isentropic orifice-flow.

Card 2/4

Analysis of hypersonic-flow ... S/040/62/026/002/010/025
D299/D301

as follows: H.S. Tsien, Similarity laws of hypersonic flow. J. Math. Phys., 1946, v. 25, no. 3; W.D. Hayes. On hypersonic similitude. Quart. Appl. Math., 1947, v. 5, no. 1; A. Shapiro, The dynamics and thermodynamics of compressible fluid, I, Ronald Press, 1953.

SUBMITTED: September 26, 1961

Card 4/4

41506

S/040/62/026/005/003/016
D234/D308

26.1410

AUTHORS: Bogacheva, A. A. and Ladyzhevskiy, M. D. (Moscow)

TITLE: A self-modelling solution of magnetohydrodynamic equations

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 5, 1962, 821-835

TEXT: The authors consider a plane stationary nonviscous supersonic flow around a wedge, assuming that there are surface currents on the edge whose intensity is inversely proportional to the square root of the distance from the wedge vertex, the conductivity is equal to zero in front of the shock wave and finite in the disturbed flow domain, the transition across the shock wave is described by the same relations as in absence of a magnetic field. Introducing an independent variable $\eta = y/x$ the authors obtain a system of three ordinary differential equations, which are investigated on the hodograph plane of the velocity. When the angle between the undisturbed flow direction and one of the lines forming the edge is smaller

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L 13212-63 EPA/EPA(b)/EWT(1)/EWT(m)/BDS/ES(v) AEDC/AFFTC/AFMDC/
ASD Paa-4/Pd-4/Pe-4 WW
ACCESSION NR: AP3004408 S/0286/63/000/004/0039/0040 70

AUTHOR: Lady*zhenskiy, M. D. [redacted]

TITLE: Method for accelerating a gas flow to hypersonic velocities by means of a reaction nozzle. Class F, No. 153153

SOURCE: Byul. izobret. i tovarny*kh znakov, no. 4, 1963, 39-40

TOPIC TAGS: hypersonic flow, boundary layer, jet nozzle

ABSTRACT: This Author's Certificate was issued for a method of accelerating a flow of gas to hypersonic velocities by means of a jet nozzle (see Fig. 1 of Enclosure). The parasitic effect of the boundary layer is eliminated by expanding the flow, which is achieved by an increase in the throat area, and high rarefication of the gas at the nozzle outlet. Orig. art. has: 1 figure.

ASSOCIATION: none

SUBMITTED: 00 DATE ACQ: 20Aug63 ENCL: 01

SUB CODE: AI NO REF SOV: 000 OTHER: 000

Card 1/2

S/040/63/027/001/007/027
D251/D308

AUTHOR: Ladyzhenskiy, M.D. (Moscow)

TITLE: On magnetohydrodynamic hypersonic flow round a wedge

PERIODICAL: Prikladnaya matematika i mekhanika, v. 27, no. 1, 1963, 55-60

TEXT: The author considers the flow around a wedge of a gas which is ideal, perfect, and possesses finite conductivity in the region behind the shock wave. It is supposed that the magnetic field is inclined at an arbitrary angle to the surface about which the flow takes place, and that the velocity of flow is hypersonic. By establishing the equation of motion in dimensionless form and using boundary value methods and independent Crocco variables, a solution is obtained which gives a different value for the pressure from that calculated by Newton's formula in the author's earlier work (PMM, 1959, v. 23, no. 6) and allows for the possibility of cavitation in addition to rupture, whereas the earlier work allowed only for rupture. In the case where the magnetic field vector is inde-

S/040/63/027/001/007/027
D251/D308

On magnetohydrodynamic ...

pendent of the arc length along the Body, a detailed solution is given. There are 3 figures.

SUBMITTED: September 18, 1962

Card 2/2

LADYZHENSKIY, M.D. (Moskva)

Viscous hypersonic flow past slender bodies. Prikl. mat. i mekh. 27 no.5:765-778 S-O '63. (MIRA 16:10)

LADYZHENSKY, M.D. (Moscow)

"Some problems of gasdynamics of three-dimensional flows".

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 Jan - 5 Feb 64.

ACCESSION NR: AP4019966 S/0020/64/154/006/1297/1298

AUTHOR: Galkin, V. S.; Lady*zhenskiy, M. D.

TITLE: Computation of the boundary layer of a compressible fluid with slip boundary conditions

SOURCE: AN SSSR. Doklady*, v. 154, no. 6, 1964, 1297-1298

TOPIC TAGS: hydrodynamics, compressible fluid, slipping boundary condition, boundary layer, velocity discontinuity, slip, boundary condition, viscous flow

ABSTRACT: The authors investigated the effect of velocity discontinuities and temperature near the walls on the flow of a compressible fluid in the boundary layer on plane and axially-symmetrical bodies under conditions when the interference of the boundary layer with the nonviscous flow, the influence of the cross sectional curvature, and the like, can be considered independently from slipping. They have solved the problem by certain assumptions concerning the temperature at the boundary and by introducing the Dorodnitzy*n's variables. The

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ACCESSION NR: AP4019966

procedure is a generalization of the method used in the theory of non-compressible viscous flow in which the effect of velocity of slipping is taken into consideration by a shift of the y-coordinate which is proportional to the mean free path of gas molecules. Orig. art. has: no figures, 3 equations.

ASSOCIATION: none

SUBMITTED: 03Jul63 DATE ACQ: 23Mar64 ENCL: 00

SUB CODE: PH NO REF SOV: 002 OTHER: 001

Card 2/2

L 10802-65 EWT(1)/EWP(m)/EWG(v)/FCS(k)/EWA(1) Pd-4/Pe-5/Pi-4 AFWL/
ESD(t)/AEDC(a)/AFTC(a)/ASD(f)-2/AFETR/ESD(gs) RM/WW
ACCESSION NR: AP4015964 S/0040/63/027/005/0765/0778

AUTHOR: Ladyzhenskiy, M. D. (Moscow)

TITLE: Viscous hypersonic flow around thin bodies

SOURCE: Prikl. matem. i mekhan., v. 27, no. 5, 1963, 765-778

TOPIC TAGS: viscous flow, hypersonic flow, thin body, boundary layer, Navier Stokes equation, axisymmetric flow, boundary condition, nonviscous flow

ABSTRACT: The author considers hypersonic flow around a thin body by a viscous, heat-conductive gas. His assumption that the thickness of the boundary layer is comparable to or exceeds the thickness of the body entails moderate or strong interaction of the nonviscous flow with the boundary layer. The author sets up equations and formulates boundary conditions for three-dimensional flow around a tapered body. He does this by analyzing Navier-Stokes equations whose relative error Δ is the same as that of equations derived for the boundary layer in plane and axisymmetric flows. The essential characteristic of this problem is the necessity of calculating the relative pressure change across the region in which viscous forces predominate (despite the fact that viscous forces are of order of magnitude Δ). This contrasts with the plane and axisymmetric problems. Analogously to the division of plane

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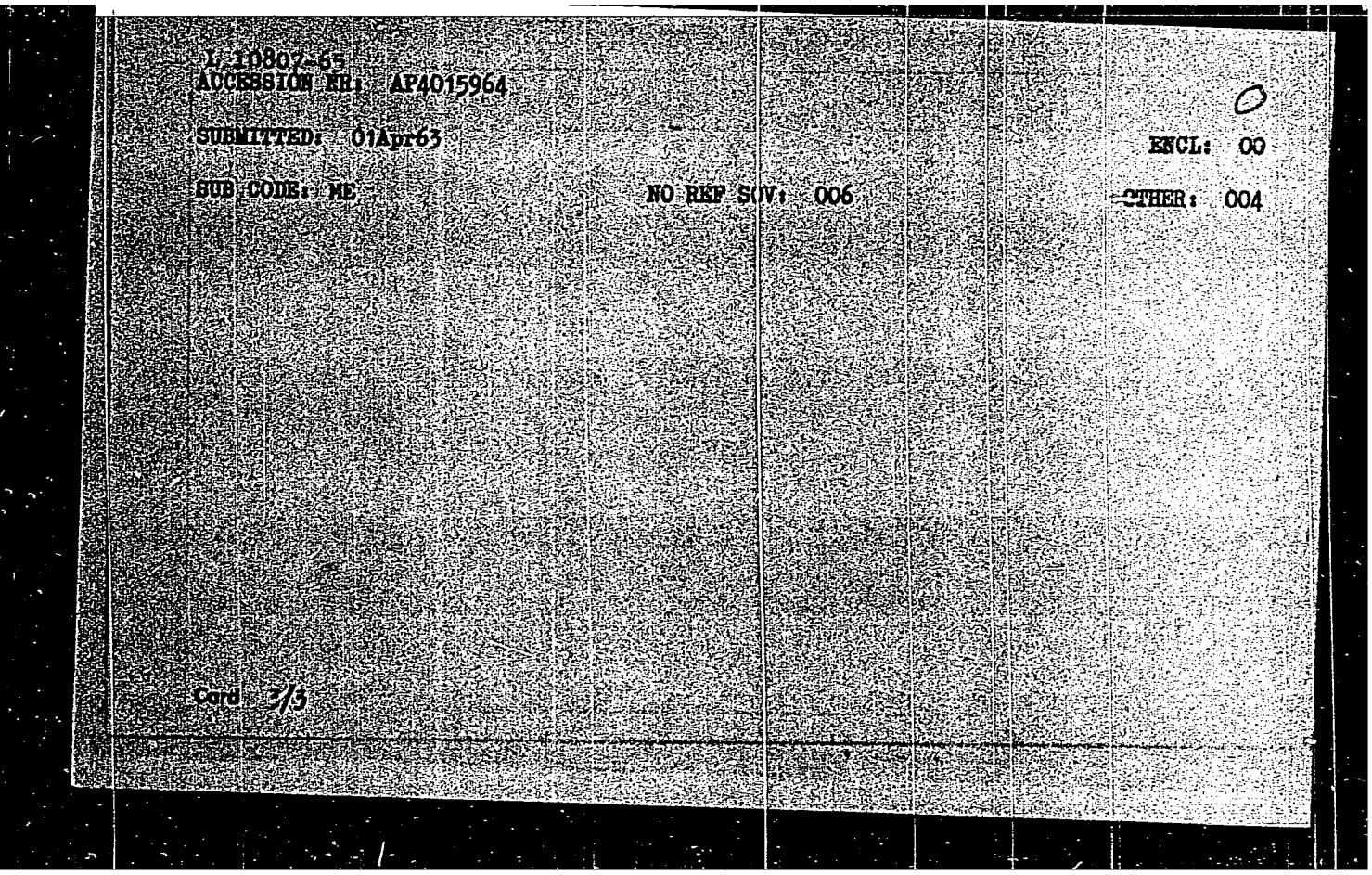
axisymmetric hypersonic flow around a thin body into nonviscous flow and boundary layer; three-dimensional hypersonic flow is divided into viscous and nonviscous flow. To within the error, Δ, of the theory, the nonviscous flow will be axisymmetric, because the pressure depends essentially on the x coordinate alone in the region of viscous flow. It then follows that the ratio of lifting force in this case to that of a body in nonviscous flow is of the same order of magnitude as Δ (i.e., within the postulated limits of accuracy may be taken equal to 0). For the obtained system of three-dimensional equations, the author gives a self-similar solution which generalizes the known exact solution for the equations of an axisymmetric boundary layer with interaction. By obtaining an asymptotic solution for the equations of self-simulating motion near the exterior boundary of the region of viscous flow, he is able to prove the problem properly formulated. He studies flow around a tapered body as well as a body with slight blunting in considering the case of flow around a body of rotation at an angle of attack much smaller than the relative thickness of the body when linearization of the (relatively) axisymmetric flow is possible. "The author thanks V. S. Galkin, M. N. Kogan, V. S. Nikolayev, V. V. Struminskiy, and V. V. Rybchev for their very valuable discussions." Orig. art. has: 67 formulas.

ASSOCIATION: none

Card 2/3



L 10809-65
ACCESSION NR: AP4015964

SUBMITTED: 01Apr63 ENCL: 00

SUB CODE: ME NO REF SOV: 006 OTHER: 004

Card 3/3

L 8899-65 EWT(d)/EWT(l)/EPA(b)/EWT(m)/EWG(v)/EWP(k)/FCS(k)/EWA(h)/EWP(r)
Pd-4/Pe-5/Pf-4 ASD(f)/AEDC(a)/SSD/ASD(p)-3/SSD(gs)/AFETR/ASD(d)/ESD(t)/AFWL/BSD/
AFTC(a) WW

ACCESSION NR: AP4046267 S/0040/64/028/005/0835/0844

AUTHOR: Ladyzhenskiy, N. D. (Moscow)

TITLE: Three-dimensional hypersonic flow near thin wings

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 5, 1964, 835-844

TOPIC TAGS: hypersonic flow, three dimensional hypersonic flow, inviscid flow, viscous flow, entropy layer, boundary layer, strip theory

ABSTRACT: The problems of a hypersonic inviscid gas flow over thin wings with a blunted leading edge and of a viscous gas flow near wings with a sharp leading edge are considered. It is shown that the strip theory, which is used to calculate the flow outside the entropy and boundary layers, is not valid when the thickness of these layers is comparable to or exceeds wing thickness. In the case of viscous gas flow, the strip theory may be applicable to the whole flow at small values of the parameter $\varepsilon=(\kappa-1)/(\kappa+1)$, where κ is the adiabatic exponent. An example is given for the case of inviscid flow over a thin

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ACCESSION NR: AP4046267

wing with a blunted leading edge for three different values of the swept angle (30°, 45°, and 60°) under the assumption of isentropic flow inside the entropy layer. A self-similar solution of the problem of viscous gas flow near a triangular plate with shaped leading edge is considered under the regime of a strong inviscid flow-boundary layer interaction. The effects of the leading edge bluntness and viscosity on a three-dimensional hypersonic flow near thin wings are evaluated when the entropy and boundary layer thicknesses are comparable to or exceedingwing thickness. Orig. art. has: 5 figures and 27 formulas.

ASSOCIATION: none

SUBMITTED: 02Apr64 ATD PRESS: 3109 ENCL: 00

SUB CODE: ME NO REF SOV: 006 OTHER: 004

Card 2/2

L 32110-65 EWT(1)/EWP(m)/EWC(s)-2/EWC(v)/EPR/EPA(bb)-2/FCS(k) Pd-1/Pe-5/
Pe-4/Pw-4 WW
ACCESSION NR: AP5006258 S/0040/65/029/001/0099/0105

AUTHOR: Ladyzhenskiy, M. D. (Moscow)

TITLE: Hypersonic flow in nozzles 44

SOURCE: Prikladnaya matematika i mekhanika, v. 29, no. 1, 1965, 99-105 B

TOPIC TAGS: hypersonic flow, nozzle flow, nozzle

ABSTRACT: To study the possibility of obtaining arbitrarily high Mach numbers by isentropic nozzle flow, an analysis was made of one-dimensional hypersonic flow of an ideal gas through a diverging nozzle whose parabolic surface is described by the equations:

$$y = cx^k(1 + \Delta(x)), \quad \lim_{x\to\infty} \Delta(x) = 0.$$

Isentropic equations for hypersonic flow developed previously by the author were used. As had been shown, hypersonic nozzle flow is characterized by the relationship $K = M_a\theta$, where M_a is the Mach number at a given station and θ is the sine of the angle between the velocity vector and the nozzle axis. It was found that $K \sim x^m$, where $m = k/n - 1$. The following cases were analyzed in detail: (1)

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L 32112-65

ACCESSION NR: AP5006258

0

1 > k > n, (2) k = n, and (3) n > k > 0. For case (1) it was found that flow without shocks is impossible. In case (2) K remains constant as $x \to \infty$ and $\theta \to 0$. The equations reduce to non-steady-state flow equations similar to those obtained by the method of small perturbations. In case (3) $K \to 0$ as x increases. In this case hydraulic approximations may be used since the enthalpy, pressure, and density are constant in a given cross sectional plane. Possible flow configurations are plotted. Orig. art. has: 27 formulas and 6 figures. [PV]

ASSOCIATION: none

SUBMITTED: 24Apr64 ENCL: 00 SUB CODE: ME

NO REF SOV: 006 OTHER: 002 ATD PRESS: 3200

Card 2/2

15 mar 65

LADZHENSKIY, M.D. [deceased] (Moskva)

Strong interaction between the boundary layer and an inviscid flow on a triangular wing. Prikl. mat. i mekh. 29 no.4:635-643 Jl-Ag '65. (MIRA 18:9)

L 62508-65 EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(t)/ETI-2/EWP(k)/FCS(k)/EWA(h)/EWA(l)
WW/EM

ACCESSION NR: AP5021298 UR/0040/65/029/004/0635/0643

15 mayo5

AUTHOR: Ladyzhenskiy, M. D. (Moscow) (Deceased) 44 B

TITLE: On the strong boundary layer-viscous flow interaction on a delta wing 24

SOURCE: Prikladnaya matematika i mekhanika, v. 29, no. 4, 1965, 635-643

TOPIC TAGS: viscous flow, hypersonic flow, angle of attack, aerodynamics, boundary layer thickness, shock wave, slip flow, flow analysis, thin wing, delta wing

ABSTRACT: A hypersonic viscous gas flow over an infinitely thin delta wing at zero angle of attack is considered at $M_\infty = \infty$ and boundary layer-viscous flow interaction is investigated. The equation of a three-dimensional boundary layer in Cartesian coordinates is considered and a solution is sought for the region near the plane of wing symmetry. It was shown that the effective body thickness, which is dependent upon the displacement effect of the boundary layer, increases because the secondary flow streamlines, that is, those from the right and left leading edges, converge to the plane of wing symmetry. The thickening of the effective body near the plane of symmetry leads to the formation of a shock wave with a cross section in the form of a semicircle in the plane of x = constant, and to a rise in pressure over the value obtained for flows over a flat plate with slip. It was also shown that the

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ACCESSION NR: AP5021298

cross section of an effective body in a plane perpendicular to the velocity vector of a free stream approaches a semicircle when the Reynolds number tends to infinity. As an illustrative example, the results of a numerical calculation of the rise in pressure and the effective body thickness are given in graphs. Orig. art. has: 3 figures and 29 formulas.

[AB]

ASSOCIATION: none

SUBMITTED: 10Oct64 ENCL: 00 SUB CODE: ME

NO REF SOV: 004 OTHER: 002 ATD PRESS: 4072

Card 2/2

L 22708-66 EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(w)/EWA(d)/T-2/EWP(k)/EWA(h)/ETC(m)-6/
EWA(1) EM

ACC NR: AP6010855 SOURCE CODE: UR/0421/66/000/001/0142/0144

AUTHOR: Ladyzhenskiy, M. D. (Deceased; Moscow); Lipin, A. V. (Moscow)

ORG: none

TITLE: Aerodynamic properties of rectangular plates in rarefied, hypersonic gas flow

SOURCE: AN SSSR. Izvestiya. Mekhanika zhidkosti i gaza, no. 1, 1966, 142-144

TOPIC TAGS: hypersonic aerodynamics, hypersonic flow, viscous flow, free molecular flow, wind tunnel test, lift coefficient, drag coefficient, thin wing

ABSTRACT: An experimental investigation of aerodynamic properties of rectangular plates at an angle of attack in viscous hypersonic air flows was carried out with the purpose of determining the optimal dimensions of wings. These experiments were conducted in a low density wind tunnel on various rectangular plates having the same surface s, of various aspect ratios $\lambda = 0.1—9$, of relative thicknesses $\delta = d/\sqrt{s} = 0.025—0.16$ at a free-flow Mach number $M = 5.15$ and temperature $T_0 = 293°K$ and $R_e = 2.3 \times 10^2$ under the assumption that the wing surface temperature is much lower than the air-flow stagnation temperature. The experiments included measurements of normal and tangential components of

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aerodynamic forces at different angles of attack. Comparisons of experimental values of the drag $C_x(\alpha)$ and lift $C_y(\alpha)$ coefficients obtained here with theoretical data based on the theory of free-molecular flow for total diffusion reflection, show that the theoretical values of the lift coefficient agree better with experiment than those of the drag coefficient. It was also established that the drag coefficient at $\alpha = 0$ decreases with λ, which is explained both by a decrease in the bluntness effect and by an increase in the effective Reynolds number. The dependence of K_m, the maximum value of the L/D ratio, on the aspect ratio λ and relative thickness δ is given in Fig. 1 and Fig. 2. The

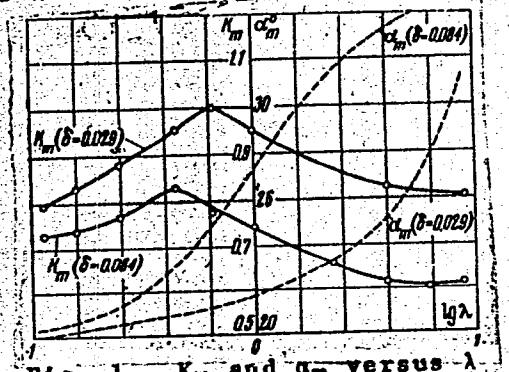

Fig. 1. K_m and α_m versus λ

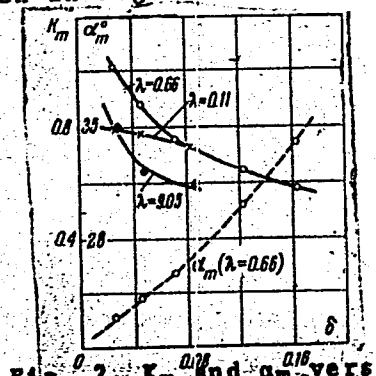

Fig. 2. K_m and α_m versus δ

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ACC NR: AP6010855 O

values of α_m, the angle of attack at which the maximum K_m is attained, are plotted in Fig. 1. An analysis of the curves shows that the values of K_m for a rectangular plate of finite surface and thickness have a maximum at a certain value of λ and that in case of viscous, hypersonic flows, wings with small aspect ratios ($\lambda<1$) are more advantageous than wings with larger aspect ratio ($\lambda>1$), in contrast to what happens at large Reynolds numbers. Orig. art. has: 5 figures. [AB]

SUB CODE: 20/ SUBM DATE: 25Jul65/ ORIG REF: 001/ OTH REF: 001/
ATD PRESS: 4229

Card 3/3 BK

LADYZHENSKIY, M.M.

Prospects for using the "Zenit-2" electronic computer in the petroleum and petrochemical industries. Mash. i neft. obor. no.2:30-35 '64. (MIRA 17:8)

S/123/61/000/020/031/035
A004/A101

AUTHOR: Ladyzhenskiy, M. M.

TITLE: Remote control of the welding current intensity

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 20, 1961, 41, abstract 20L237 ("Sudostroyeniye", 1961, no. 6, 66)

TEXT: When using a multi-station welding generator, the author recommends a circuit (see Fig.) which makes it possible to remote-control the welding current. In the cited circuit the amperage is controlled by standard ballast rheostats of the РБ-200 (RB-200) and РБ-300 (RB-300) type, whose 4 cut-outs changing the resistance stages are replaced by КМ-100Д (KM-100D) contactors. The contactor coils are supplied from the welding network via a potentiometric voltage divider consisting of resistors R_6 and R_7 of 50 ohm each. Remote control of the contactors is effected with special switches having 13 fixed positions. The switch is connected to the supply circuit of the contactor coils by a 5-core cable 25-35 m long and a ШР-28 (ShR-28) plug. There is 1 figure.

N. Alekseyev

[Abstracter's note: Complete translation]

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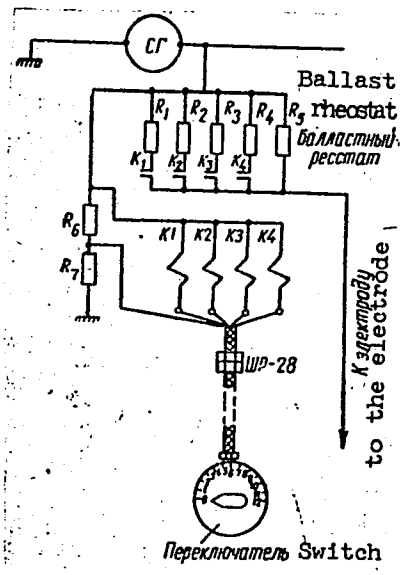
S/123/61/000/020/031/035
A004/A101

Remote control of the welding current density

Figure:



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LADYZHENSKIY, M.M., inzh.

Prospects for the use of electronic controlling machines for the automation of marine power plants. Sudostroenie 29 no.7:35-38 Jl '63. (MIRA 16:9)

(Electricity on ships) (Automation)

LADYZHENSKIY, M.M.; LYUBOMIRSKAYA, S.I.; TANKHILEVICH, V.A.; TOMASHEVSKAYA, I.A.; TSIRKEL', M.L.; GRANATMAN, V.V., red.

[Use of TK-3B,TKh-4B, and TKh-5B cold-cathode thyratrons in pulse circuits] Opyt primeneniia tiratronov s kholodnym katodom tipov TK-3B, TKh-4B, TKh-5B v impul'snykh skhemakh. Leningrad, 1964. 22 p. (MIRA 17:11)

LADY[illegible] (Leningrad)

[illegible]dy and comparative analysis of transistor switches with different control principles. Avtometriia no.4:89-96 '65. (MIRA 18:9)

PORFIR'YEV, V.B.[Porfir'iev, V.B.], akademik; GRINBERG, Y.V. [Hrinberh, I.V.]; LADYZHENSKIY, M.R.[Ladyzhens'kyi, M.R.]; LINETSKIY, V.P.[Linets'kyi, V.P.]; GALABUTSKAYA, K.A. [Halabuts'ka, K.A.]; TKACHUK, L.G.[Tkachuk, L.H.]; SVARICHEVSKIY, L.V.[Svarychevs'kyi, L.V.]; RIPUN, M.B. [Rypun, M.B.]; GABINET, M.P.[Habinet, M.P.]; CHEKHOVICH, N.Ya.[Chekhovych, N.IA.], red.; MATVIICHUK, O.O., tekhn. red.

[Carpathian menilite shales] Menilitovi slantsi Karpat. Kyiv, Vyd-vo Akad. nauk URSR, 1963. 204 p. (MIRA 16:6)

1. Akademiya nauk Ukr. SSR (for Porfir'yev). Institut geologii goryuchikh iskopayemykh AN Ukr.SSR (for all except Chekhovich, Matviichuk).

(Carpathian Mountains--Oil shales)

LADYZHENSKIY, N.R. [Ladyzhens'kyi, M.R.]; PLOTNIKOV, A.M.; GORDIYEVICH, V.A. [Hordiyevich, V.A.]

Sulfur on the Dzhau-Tepe mud volcanoe (Kerch Peninsula). Dop. AN URSR no.5:640-643 '65. (MIRA 18:5)

GTRSPL, NO. 45

Vyalov, O.S., Ladyzhinski, N.R. and Tkachuk, L.G. (Institute of the Geology of Useful Fossils, Ukrainian S.S.R. Academy of Sciences and the Lvov Polytechnical Institute). The tufaceous level in the menilite range of the eastern Carpathians, 137-9

Akademiya Nauk, S.S.S.R., Doklady, Vol. 79, no. 1

LADYZHENSKIY, N.R.

POLFIR'YEV, Vladimir Borisovich; GRINBERG, Iona Vol'kovich; LADYZHENSKIY, Nikolay Romanovich; GALABUTSKAYA, Yekaterina Antonovna; LIMETSKIY, Viktor Filippovich, SVARICHEVSKIY, Lyudomir Vladimirovich; LAZARENKO, Ye.K., otvetstvennyy redaktor; LISENBART, D.K., redaktor izdatel'stva; RAKHLINA, N.P., tekhnicheskiy redaktor

[Menilite shale, a source for industrial building materials] Menilitovye slantsy - syr'e dlia promyshlennosti stroitel'nykh materialov. Kiev, Izd-vo Akademii nauk USSR, 1956. 37 p. (MIRA 9:7)

1. Chlen-korrespondent AN USSR (for Lazarenko)
(Shale)

PORFIR'YEV, V.B., otvetstvennyy redaktor; LADYZHENSKIY, N.R., kandidat geologo-mineralogicheskikh nauk, redaktor; LAZARENKO, K.K., redaktor; GURZHIY, D.V., kandidat geologo-mineralogicheskikh nauk, redaktor; ZAVIRYUKHINA, V.N., redaktor; ZHUKOVSKIY, A.D., tekhnicheskiy redaktor

[Papers on the problem of the origin and migration of petroleum] Materialy diskussii po probleme proiskhozhdeniia i migratsii nefti. Kiev, 1956. 366 p. (MLRA 10:3)

1. Akademiya nauk URSR, Kiyev. L'vivskyi filial. Instytut geologii korysnykh kopalyn. 2. Chlen-korrespondent Akademii nauk USSR (for Profir'yev, Lazarenko)
(Petroleum geology)

LADYZHENSKIY, N.R.

PORFIR'YEV, V.B., akademik, red.; BROD, I.O., prof., red.; LADYZHENSKIY, N.R., red.; YERSHOV, P.R., vedushchiy red.; POLOSINA, A.S., tekhn.red.

[Problem of the migration of oil and the formation of oil and gas accumulations; materials of the Lvov discussion, May 8-12, 1957] Problema migratsii nefti i formirovaniia neftianykh i gazovykh skoplenii; materialy L'vovskoi diskussii 8-12 maia 1957 g. Pod red. V.B.Porfir'eva i I.O.Broda. Moskva, Gos.nauchno-tekhn.izd-vo neft.i gorno-toplivnoi lit-ry, 1959. (MIRA 12:4)

1. Akademiya nauk USSR, Kiyev. L'vovskiy filial. Institut geologii poleznykh iskopayemykh. 2. Akademiya nauk USSR, predsedatel' Orgkomiteta L'vovskoy diskussii 8-12 maya 1957 g. (for Porfir'yev). 3. Kafedra geologii i geokhimii goryuchikh iskopayemykh Moskovskogo universiteta im. Lomonosova, Moskva, i Institut nefti AN SSSR (for Brod).

(Petroleum geology)

LADYZHENSKIY, N.R. [Ladyzhens'kyi, M.R.]

Development of views on the geology of gas fields in western region of the Ukrainian S.S.R. Pratsi Inst. geol. kor. kop. AN URSR 1:101-107 '59. (MIRA 14:6)
(Ukraine—Gas, Natural—Geology)

LADYZHENSKIY, Nikolay Romanovich, prof.; ANTIPOV, Viktor Ivanovich; PORFIR'YEV, V.B., akademik, red.; YUNGANS, S.M., vedushchiy red.; VORONOVA, V.V., tekhn. red.

[Geology, and gas and oil potentials of the Soviet cis-Carpathian region] Geologicheskoe stroenie i gazoneftenosnost' Sovetskogo Predkarpat'ia. Moskva, Gos. nauchno-tekhn. izd-vo neft. i gorno-toplivnoi lit-ry, 1961. 265 p. (MIRA 14:10)

1. Akademiya nauk USSR (for Porfir'yev)
(Carpathian Mountain region—Petroleum geology)
(Carpathian Mountain region—Gas, Natural—Geology)

LADYZHENSKIY, N.R.

Time of the formation of oil fields in the Carpathians.
Geol.sbor. [Lvov] no.7/8:79-88 '61. (MIRA 14:12)

1. Institut geologii poleznykh iskopayemykh AN USSR, L'vov.
(Carpathian Mountain region--Petroleum geology)
(Geological time)

ANTIPOV, Viktor Ivanovich; LADYZHENSKIY, N.R., doktor geol.-miner. nauk, otv. red.; MEL'NIK, A.F., red.

[Seismotectonics of the western provinces in the Ukraine] Seismotektonika zapadnykh oblastei Ukrainy. Kiev, Naukova dumka, 1965. 54 p. (MIRA 18:4)

VARNOVITSKIY, I.N.; LADYZHENSKIY, P.B.

Present status and future development of welding techniques in East Germany. Biul.tekh.-ekon.inform. no.8:76-78 '60.
(MIRA 13:9)

(Germany, East--Welding)

VORNOVITSKIY, I.N.; LADYZHINSKIY, P.B.

Improvement of welding techniques in East Germany, Czechoslovakia, and Poland. Biul.tekh.-ekon.inform. no.1:93-96 '61. (MIRA 14:2)
(Germany, East—Welding) (Czechoslovakia—Welding)
(Poland—Welding)

ACCESSION NR: AP4043189 S/0070/64/009/004/0516/0520

AUTHORS: Fedulov, S. A.; Lady*zhenskiy, P. B.; Venevtsev, Yu. N.

TITLE: Investigation of the system $BiFeO_3$-$LaAlO_3$

SOURCE: Kristallografiya, v. 9, no. 4, 1964, 516-520

TOPIC TAGS: bismuth inorganic compound, lanthanum compound, ferroelectric property, perovskite structure, solid solution, dielectric constant

ABSTRACT: Both investigated compounds have a perovskite structure and were expected to form solid solutions. It was also assumed that addition of $LaAlO_3$ to $BiFeO_3$ would lead to a decrease of the conductivity which would facilitate the study of the temperature dependence of the dielectric constant in a wide range of temperatures. It was assumed that the results of these measurements would further confirm the presence of ferroelectric properties in bismuth ferrite. The in-

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ACCESSION NR: AP4043189

vestigation of the system was also aimed at studying the effect of various factors on the magnetic properties of similar compounds, and to determine regions in which they possess special dielectric and magnetic properties. The starting materials were Bi_2O_3, Fe_2O_3, Al_2O_3 (analytical purity), and La_2O_3 (technical purity). The x-ray analysis was carried out with CuKα and CoKα radiation. The lattice parameters were determined to within 0.0015 Å, the volume to within 0.07 $Å^3$, and the angle to within 2'. The magnetic measurements were carried out by a method described in Kristallografiya v. 8, no. 4, p. 610, 1963. X-ray analysis of samples with intermediate compositions showed that one-phase perovskite solid solutions occurred only up to 37.5 mole % $LaAlO_3$. Samples with 25--35 mole % $LaAlO_3$ exhibit the clear maxima of the dielectric constant typical of ferroelectrics. With increasing $LaAlO_3$ content the maxima shift towards lower temperatures. The temperature dependence of the specific magnetization for samples of the homogeneous region was obtained at H = 7600 Oe.

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ACCESSION NR: AP4043189

All solid solutions were found to be antiferromagnetic with weak ferromagnetism. For samples with 35 mole % $LaAlO_3$ the specific spontaneous magnetization reaches 0.15. The Curie temperature of $BiFeO_3$ is estimated by extrapolation to be about 850°C. The data make it possible to construct a part of the phase diagram of the system $BiFeO_3$--$LaAlO_3$ on the side of $BiFeO_3$ (Encl. 01). The decrease of the ferroelectric Curie temperature with increasing $LaAlO_3$ content is due, in the opinion of the authors, to the considerably weaker electron polarizability of the Li^{3+} ion compared with that of Bi^{3+}. Most interesting is the rather strong increase of the Neel temperature on the introduction of $LaAlO_3$. This is due mainly to the somewhat smaller lattice constant of $LaAlO_3$. "The authors thank Prof. G. S. Zhdanov and Yu. E. Roginskaya for valuable advice and remarks."
Orig. art. has: 7 figures.

Card 3/5

ACCESSION NR: AP4043189

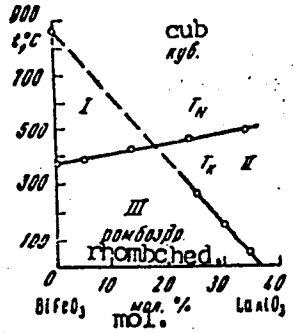
ASSOCIATION: VNII khimicheskikh reaktivov i osobo chisty*kh veshchestv Fiziko-khimicheskiy institut im. L. Ya. Karpova (All-Union Institute of Chemical Reagents and Ultrapure Materials, Physico-chemical Institute)

SUBMITTED: 25Sep63 ENCL: 01

SUB CODE: SS NR REF SOV: 014 OTHER: 002

Card 4/5

ACCESSION NR: AP4043189 ENCLOSURE: 01



Part of the phase diagram of the $BiFeO_3$-$LaAlO_3$ system on the $BiFeO_3$ side.

T_K - ferroelectric Curie temperature, T_N - antiferromagnetic Neel temperature
I - ferroelectric region
II - region of weak ferromagnetism
II - region with combined properties

Card 5/5

LADYZHENSKIY, P. M.

Air Conditioning

Effective system of automatic regulation. Tekst. prom. 12, No. 9, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952. UNCLASSIFIED

LADYZHENSKIY, B.M.; NIKOLAYEVA, N.G., redaktor; MEDVEDEVA, L.A., tekhnicheskiy redaktor

[Air conditioning] Konditsionirovanie vozdukha. Moskva, Pishchepromizdat, 1952. 275 p. (MIRA 10:1)
(Air conditioning)

LADYZHENSKIY, R.M., kand. tekhn. nauk.

Investigating the movement of a spheroid bubble in a liquid medium. Trudy LTIKHP 5:105-115 '54. (MIRA 11:3)

(Bubbles)

LADYZHENSKIY, R. M.

(3)

Investigation of rise of air bubbles in water at high Reynolds numbers. R. M. Ladyzhenskii. *Zhur. Prikladi Khim.* 27, 22–32(1954).—The rate of rise of smaller bubbles up to 3 cc., was previously investigated by Gorodetskaya (*C.A.* 43, 4082a) and by Smirnov, *et al.* (*C.A.* 46, 4320a). L. investigates larger bubbles up to 20 cc. and larger. The correlation of exptl. and calcd. values is in closer agreement as the bubble vol. and Reynolds no. increase to 20 cc. and 12800, resp. Bubble deformation in its movement is analyzed in detail. I. Bencowitz

LADYZHENSKIY, R.M.

GALOCHKIN, Nikolay Aleksandrovich; LADYZHENSKIY, R.M., dotsent, retsenzent; GOL'DSHTEYN, I.D., redaktor; DASHKOVA, Z.P., redaktor; KOLESNIKOVA, A.P., tekhnicheskiy redaktor

[Ventilation of pulp and paper factories] Ventiliatsiia predpriiatii tselliuloznobumazhnoi promyslhennosti. Moskva, Goslesbumizdat, 1955. 222 p. (MLRA 8:11)
(Ventilation) (Wood-using industries)

LADYZHENSKIY, R.M.

Investigation of the shape of a gas bubble rising in a stationary fluid. R. M. Ladyzhenskii. Zhur. Priklad. Khim. 29, 102-200(1956); cf. C.A. 48, 6780b.—Math. analysis of capillary, hydrodynamic, and gravitational forces affecting the shape of a rising bubble in a stationary medium indicate that the effect of the first 2 is negligible. The method used for the detn. of this shape is outlined. For bubbles of air (0.15 and 4 cc.) rising in H_2O the exptl. data, over a wide range of Reynolds nos., are expressed by: $v = \sum_{i=1}^{i=n} \Delta z_i \pi r_i^2$ and $l = \sum_{i=1}^{i=n} (\Delta z_i^2 + \Delta r_i^2)^{1/2}$, where v is the vol. of the bubble, l the meridianal length, z the distance from the upper curvature to any horizontal plane passing through the spheroid, and r is the radius of this plane. L. B.

LADYZHENSKIY, Roman Markovich; VEYNBERG, B.S., spetsredaktor; AKIMOVA, L.D., red.; KISINA, Ye.I., tekhn.red.

[Air conditioning] Konditsionirovanie vozdukha. Izd. 2-oe, perer. i dop. Moskva, Pishchepromizdat, 1957. 441 p. (MIRA 11:5)
(Air conditioning)

LADYZHINSKIY, R. M.

"Calculation of Injector Air-coolers."

Report submitted for the Conference on Heat and Mass Transfer, Minsk, BSSR, June 1961.

LADYZHENSKIY, Roman Markovich; GOGOLIN, A.A., retsenzent; NIKOLAYEVA, N.G., red.; EL'KINA, E.M., tekhn. red.

[Air conditioning]Konditsionirovanie vozdukha. 3. izd., perer. i dop. Moskva, Gostorgizdat, 1962. 350 p. (MIRA 15:11)
(Air conditioning)

BUNAKOV, A.G., kand.tekhn. nauk (Khar'kov); VANDOLOVSKIY, A.G., inzh. (Khar'kov); LADYZHENSKIY, V.N., inzh. (Khar'kov); LOZANSKIY, V.R., kand. tekhn. nauk (Khar'kov)

Concrete pipes for irrigation systems. Gidr. i mel. 16 no.10: 20-24 O '64. (MIRA 17:12)

LADYZHENSKIY, V. P.

IVANOV, V.I., inzh.; KORSHUN, G.F., inzh.; POGREBENSKIY, G.M., inzh.; BEKKER, D.Z., inzh.; LADYZHENSKIY, V.P., inzh.

Machine used for simultaneous laying and plastering of brick blocks. Rats. i zobr. predl. v stroi. no.2:28-33 '57. (MIRA 11:1)

1. Omskstroy Ministerstva stroitel'stva predpriyatiy neftyanoy promyshlennosti.

(Building blocks) (Building machinery)

VANDOLOVSKIY, O. [Vandolovs'kyi, O.], inzh.; LADYZHENSKIY, V. [Ladyzhens'kyi, V.], inzh.; UGINCHUS, D. [Uhinchus, D.], inzh.

Conference on problems of the use of carbonate aggregates. Bud. mat.i konstr. no.5:62-64 S-O '62. (MIRA 15:11)
(Rocks, Carbonate) (Aggregates (Building materials)--Congresses)

GIRBASOVA, Ye.I., red.; LADZHEVSKIY, L.G., red.; KULIYEV, M.K., red.; MIGAY, L.S., vedushchiy red.; MUKHINA, E.A., tekhn.red.

[Technical instruction charts of the complete cycle of the underground repair of wells] Instruktivno-tekhnologicheskie karty polnogo tsikla podzemnogo remonta skvazhin. Moskva, Gos. nauchno-tekhn.izd-vo neft. i gorno-toplivnoi lit-ry, 1960. 223 p. (MIRA 13:12)

1. Moscow. Nauchno-issledovatel'skiy institut truda. TSentral'noye byuro promyshlennykh normativov po trudu.
(Oil wells--Equipment and supplies)

LADYZHENSKIY, Yefim Borisovich; REUT, N.I., red.; SARAYEV, B.A., tekhn. red.

[Fitting marine shaftings by the photography of a ray of light] Montazh sudovykh valoprovodov s pomoshch'iu fotografirovaniia svetovogo lucha. Moskva, Izd-vo "Morskoi transport," 1961. 84 p. (MIRA 15:2)
(Shipfitting) (Shafting)

POLONSKIY, M.S.; ZHURAVIN, M.A.; LADYZHENSKIY, Ye.B.; PINSKER, B.I.; ZUBOV, V.O.; SHESTERIKOV, A.A.; YAKUN', F.V.; KRYNITSA, M.N.; AREF'YEV, B.A.; YEVZIKOV, L.I., starshiy stroitel' sudov; PAVLENKO, I.F.; YEKOVLEV, B.M., inzh.; MARKOV, A.P., inzh.

Readers' response to the article by engineer M.A. Daikhes entitled "Method of mounting the main engines with minor deformations of the foundation frame and the cranshaft". Sudostroenie 30 no.10:57-66 O '64. (MIRA 17:12)

1. Gruppovoy inzh.-mekhanik SSKh parokhodstva "Kaspar" (for Zubov). 2. Inzh.-inspektor Registra SSSR (for Yakun'). 3. Glavnyy inzh.-inspektor inspektsii Registra SSSR Baltiyskogo basseyna (for Aref'-yev). 4. Starshiy mekhanik teplokhoda "Tadzhikistan" (for Pavlenko).

KULAKHMET'YEVA, M.G., kandmed.nauk; LADYZHINSKAYA, M.A., ordinator

Treatment of eye burns by subconjunctival injections of penicillin combined with the patient's own blood. Oft.zhur. 14 no.6:334-337 '59. (MIRA 13:4)

1. Iz kafedry glaznykh bolezney (zav. - dots. A.S. Veys) Kazanskogo meditsinskogo instituta.
(EYE--WOUNDS AND INJURIES) (BLOOD AS FOOD OR MEDICINE)
(PENICILLIN)

S/133/61/000/011/006/010
A054/A127

AUTHORS: Babakov, A. A., Candidate of Technical Sciences, Ladyzhinskiy, B. S., Engineer

TITLE: Corrosion resistance of electric-welded 1X18H9T (1Kh18N9T) steel tubes

PERIODICAL: Stal', no. 11, 1961, 1026 - 1029

TEXT: Tests were carried out to study the corrosion resistance of stainless steel tubes 10 - 76 mm in diameter; with a wall thickness of 1 - 2 mm produced at the Moscow trubnyy zavod (Moscow Tube Plant) by continuous argon-arc welding at a rate of 1.5 - 2.0 m/min. The tests in which E. Ye. Tsypina, Engineer, I. T. Ivanova, Engineer, L. P. Basova, Laboratory Assistant, T. S. Sadykova, Laboratory Assistant, L. N. Belogurova, Laboratory Assistant and V. I. Shashina, Laboratory Assistant participated, were aimed at investigating the resistance of the welding seam to corrosion in general and to intergranular corrosion compared with the base metal. The test tubes (16 x 2 and 25 x 2 mm in size) contained 0.11% C, 0.93% Si, 0.89% Mn, 18.9% Cr, 9.1% N, 0.68% Ti and 0.10% C, 1.08% Si, 1.32% Mn, 18.5% Cr, 9.7% N and 0.50% Ti respectively. The heat treatment of the 1Kh18N9T

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Corrosion resistance of...

steel was carried out under the following conditions: a) heating alternatively to 1,050, 1,100 and 1,200°C, holding for 2, 6 and 20 minutes at each temperature; quenching in water; b) heating alternatively to 850 and 900°C with 60 and 120 minutes holding, to 950°C with 30 and 60 minutes holding; air-cooling (stabilizing anneal); c) water-hardening of the specimens at 1,050°C with subsequent stabilizing anneal at 850 - 870°C (double heat treatment). Part of the tubes was subjected to a provoking tempering (heating to 650°C, holding time 120 minutes, air-cooling) in the as delivered condition, while part of the tubes was subjected to provoking tempering after the heat treatment as mentioned above. The test tubes were boiled in aggressive media according to the following scheme: in 10-% solution of formic acid for 96 hours; in 10-% solution of acetic acid for 144 hours; in 55-% solution of nitric acid for 144 hours; in a solution of vitriol (110 g) and sulfuric acid (55 ml) in 1 liter of water (A-method, ГОСТ 6032-58 [GOST 6032-58]) for 48 hours; in a solution of vitriol (160 g) and 100 ml sulfuric acid in 1 liter of water containing copper chips for 24 hours. It was found that the tubes (16 x 2 mm) in the as delivered condition without additional heat treatment were sufficiently corrosion-resistant to formic acid, acetic acid and nitric acid. Additional heat treatment in the form of stabilizing annealing and

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quenching, without subsequent provoking tempering improved their corrosion resistance in nitric acid. The best results as to general corrosion resistance were obtained for tubes after hardening at 1,050 - 1,200°C. Provoking tempering (at 650°C) decreased the corrosion resistance of tubes in nitric acid not only for specimens in the as delivered condition, but also for those which had undergone additional heat treatment. Therefore the additional heat treatment of the tubes in the critical temperature range during operation is not necessary. However, stabilizing annealing of specimens subjected to provoking tempering prior to the tests had a positive effect on the corrosion resistance. The resistance to intergranular corrosion was studied by metallographic methods. Stabilizing anneal increased the resistance to intergranular corrosion. When operating in nitric acid of average concentration and high temperature, it was found advisable to use stainless steels with a lower carbon content and a more stable solid solution. The problem, whether additional heat treatment should be applied or not has to be decided under consideration of the composition of aggressive media involved in the production, the processes to which the tubes are subjected in the following stages at the plants producing chemical equipment and the operation conditions of the tubes in aggressive media. There are 7 figures.

ASSOCIATION: TsNIIChM and Moscow trubnyy zavod (Moscow Tube Plant)

LADYZHINSKIY, M.M.

The "Zenit-2" electronic centralized-control machine. Biul. tekh.-ekon. inform. Gos. nauch.-issl. inst. nauch. i tekh. inform. 17 no.4:37-39 Ap '64. (MIRA 17:6)

L 41157-66 EWT(1)
ACC NRR AP6015386 (N) SOURCE CODE: UR/0410/65/000/004/0089/0096

AUTHOR: Ladyzhenskiy, M. M. (Leningrad)

ORG: none

52
B

TITLE: Study and comparative analysis of transistorized gates employing different control principles

SOURCE: Avtometriya, no. 4, 1965, 89-96

TOPIC TAGS: transistorized circuit, hf transistor, germanium transistor, circuit design, silicon diode, silicon transistor, germanium diode, P-15A germanium transistor, P-406 germanium transistor, MP-106 silicon diode, P-29A germanium diode, P-30A germanium diode, MP-106 silicon transistor, MP-102 silicon transistor

ABSTRACT: A classification of noncompensated type transistor gates is proposed. A comparison is made of bipolar control in the case of noncompensated series-loaded keys using transistors of various types. Graphs are given illustrating typical relationships of residual voltage to control voltage and control current for lf germanium transistors type P-15A, hf germanium transistors type P-406, and silicon diodes type MP-106. Tabulated results are presented of residual voltage tests of a number of transistors in the B region under different control principle and at a temperature of +20C for samplings of from 100 to 200 units. Similar information is given for residual voltage stability with environmental temperature and control

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UDC: 621.316.5:681.2.08

L 41157-66

ACC NR: AP6015386

current variations. Recommendations are given regarding the selection of transistor type and control current for the design of operationally reliable gates. The conclusions show that for transistor gates it is preferable that the current source and not the voltage source be used for gate control, since current control provides a higher degree of residual voltage stability with environmental temperature and modulating voltage fluctuations, and a smaller mean value of residual voltage and mean-square deviation. The lf germanium diodes type P-15A, P-29A, and P-30 were found to be the most promising Soviet-made transistors for low-voltage switching in the +20—70C temperature range. Because of their considerable parameter spread and residual voltage instability, MP-106 and MP-102 silicon transistors can be recommended for the switching of low voltages only in circuits with an upper temperature limit of +75—130C, where the germanium devices cannot be employed. Orig. art. has: 3 formulas, 3 tables, and 4 figures.

SUB CODE: 09/ SUBM DATE: 26Sep64/ ORIG REF: 006/ OTH REF: 001

Card 2/2 hs

LADYZHINSKIY, N.R. [Ladyzhyns'kyi, M.R.]; GURZHIY, D.V. [Hurzhii, D.V.]

Ophiolitic rocks of Mount Petrosh in the Magura zone. Dop. AN URSR no. 6:789-791 '64. (MIRA 17:9)

1. Institut geologii i geokhimii goryuchikh iskopayemykh. Predstavleno akademikom AN UkrSSR V.B.Porfir'yevym [Porfyr'iev, V.B.]

ACCESSION NO: AP4013507 S/0181/64/006/002/0475/0478

AUTHORS: Fedulov, S. A.; Lady*zhinskiy, P. B.; Pyatigorskaya, L. I.; Venevtsev, Yu. N.

TITLE: Complete phase diagram of the system $PbTiO_3$ $BiFeO_3$

SOURCE: Fizika tverdogo tela, v. 6, no. 2, 1964, 475-478

TOPIC TAGS: phase diagram, PbTiO sub 3, BiFeO sub 3, piezoelectric, phase transition, Curie point, morphotropic phase transition, polarization, ferroelectric, ferromagnetic, Neel temperature, conductivity

ABSTRACT: Using x-ray investigations and electrical and magnetic measurements, the authors have constructed a complete phase diagram of the system $PbTiO_3$-$BiFeO_3$. This diagram is shown in Fig. 1 on the Enclosure. It is seen that in the region of the morphotropic phase transition the Curie point is very high (on the order of 700C), and it therefore seems suitable (in order to obtain high-temperature piezoelectric material) to introduce other material into the system to decrease the conductivity and to improve the conditions of polarization. The authors suggest, from this point of view, studies of the three-component systems $PbTiO_3$-$BiFeO_3$-$PbZrO_3$ and $PbTiO_3$-$BiFeO_3$-$LaAlO_3$. "The authors consider it their duty to express

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ACCESSION NO: AP4013507

thanks to Yu. Ye. Roginskaya for her aid in the work." Orig. art. has: 5 figures.

ASSOCIATION: Vsesoyuzny*y nauchno-issledovatel'skiy institut khimicheskikh reaktivov i osobo chisty*kh khimicheskikh veshchestv, Moscow (All-Union Scientific Research Institute of Chemical Reagents and Extra Pure Chemical Substances)

SUBMITTED: 12Aug62 DATE ACQ: 03Mar64 ENCL: 01

SUB CODE: PH NO REF SOV: 009 OTHER: 001

Card 2/2

VENEVTSEV, Yu. N.; ZHDANOV, G. S.; ROGINSKAYA, Yu. Ye.; FEDULOV, S. A.; IVANOVA, V. V.; CHKALOVA, V. V.; VISKOV, A. S.; KAPYSHEV, A. G. BONDARENKO, V. S.; LADYZHINSKIY, P. B.

Some solid solutions on the basis of the ferroelectric-antiferromagnetic $BiFeO_3$. Izv. AN SSSR. Ser. fiz. 28 no. 4: 683-690 Ap '64. (MIRA 17:5)

L 49052-65 EEC(b)-2/EPA(s)-2/EEC(k)-2/EWA(c)/EWT(l)/EWT(m)/EWP(b)/T/EWP(t) Pi-4/
Pt-7 IJP(c) GG/JD/JG

ACCESSION NR: AP5008477 UR/0070/65/010 002/0268/0270 53 46 8

AUTHOR: Fedulov, S. A.; Shapiro, Z. I.; Ladyzhinskiy, P. B.

TITLE: Application of the Czochralski technique in growing $LiNbO_3$, $LiTaO_3$, and $NaNbO_3$ single crystals

SOURCE: Kristallografiya, v. 10, no. 2, 1965, 268-270

TOPIC TAGS: crystal, piezoelectric crystal, potassium compound, niobate, tantalum compound, alkali metal, fenoelectricity, crystallization

ABSTRACT: Previously reported Soviet sources have described research on growing large piezoelectric single crystals of potassium niobate and potassium tantalate using the technique of spontaneous or oriented (seed) crystallization from a fluxed melt.

In the most recent Soviet publication, the subject has been enlarged to include all niobates and tantalates of alkaline metals, using the Czochralski technique to grow single crystals of these compounds. However, the emphasis was put on metaniobate and metatantalate of lithium, the properties of which are relatively unknown as compared to those of corresponding

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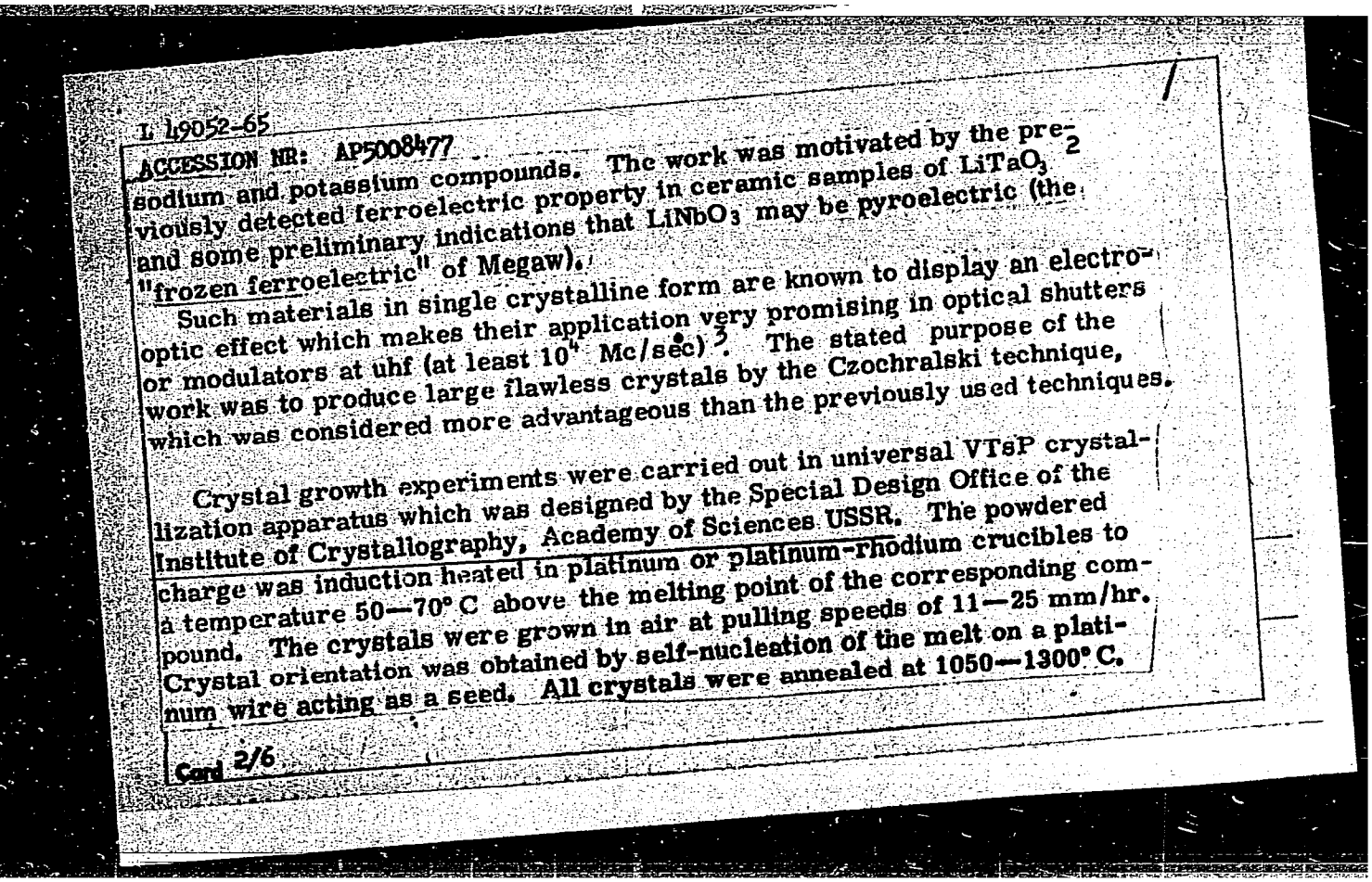

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ACCESSION NR: AP5008477

sodium and potassium compounds. The work was motivated by the previously detected ferroelectric property in ceramic samples of $LiTaO_3$ and some preliminary indications that $LiNbO_3$ may be pyroelectric (the "frozen ferroelectric" of Megaw).

Such materials in single crystalline form are known to display an electro-optic effect which makes their application very promising in optical shutters or modulators at uhf (at least 10^4 Mc/sec). The stated purpose of the work was to produce large flawless crystals by the Czochralski technique, which was considered more advantageous than the previously used techniques.

Crystal growth experiments were carried out in universal VTsP crystallization apparatus which was designed by the Special Design Office of the Institute of Crystallography, Academy of Sciences USSR. The powdered charge was induction heated in platinum or platinum-rhodium crucibles to a temperature 50—70° C above the melting point of the corresponding compound. The crystals were grown in air at pulling speeds of 11—25 mm/hr. Crystal orientation was obtained by self-nucleation of the melt on a platinum wire acting as a seed. All crystals were annealed at 1050—1300° C.

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The single crystals of the following materials were obtained by using the Czochralski technique: $LiNbO_3$ (mp = 1170° C), maximum size of 10 x 50—60 mm, transparent or yellowish (after annealing), oriented in the [0001] direction; $LiTaO_3$ (mp = 1560° C), intensely yellow-green, dimensions unspecified, prepared with some difficulty because of a relatively high melting point; and $NaNbO_3$ (mp = 1350° C), maximum size of 10x50 mm, grown with extreme difficulty because of strain which produces cracks. The strain is due to five phase transitions between 640°C and room temperature.

Attempts to grow $NaTaO_3$, $KTaO_3$, and $KNbO_3$ single crystals by the Czochralski technique failed because of the high melting point (over 1650° C) of $NaTaO_3$ or incongruent melting of the potassium compounds. The most suitable growth techniques for large single crystals of the potassium compounds are believed to be either crystallization from fluxed melts, with seeding as described by C. E. Miller[4] or hydrothermal growth. The $NaTaO_3$ single crystals might be grown by the Czochralski technique but in crucibles made of more refractory metals or alloys.

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Only samples of rubidium and cesium niobates and tantalates were prepared by the usual ceramic technology to establish their crystal structure. The x-ray study of the samples indicated a structure different from perovskite for these compounds. This finding seems to contradict a previous Soviet source which attributed perovskite structure to $RbNbO_3$ and $RbTaO_3$.

The Karpov Physicochemical Institute and the All-Union Scientific Research Institute of Chemical Reagents and High-purity Substances were given as the authors' affiliation.

In a post-scriptum, the authors pointed out recent American sources, which reported a large electro-optic effect in single crystals of $K(Ta,Nb)O_3$ solid solutions,[4] and in $LiNbO_3$ and $LiTaO_3$[5] crystals grown by the Czochralski technique.[6]

COMMENT: The technique used by the authors to produce single crystals of $LiNbO_3$ and $LiTaO_3$ closely resembles the one more recently described by A. A. Ballman. However, the crystals produced by the Soviet authors, according to the descriptions given, seem to be somewhat inferior in respect to color and dimensions. The authors of the Soviet article erroneously

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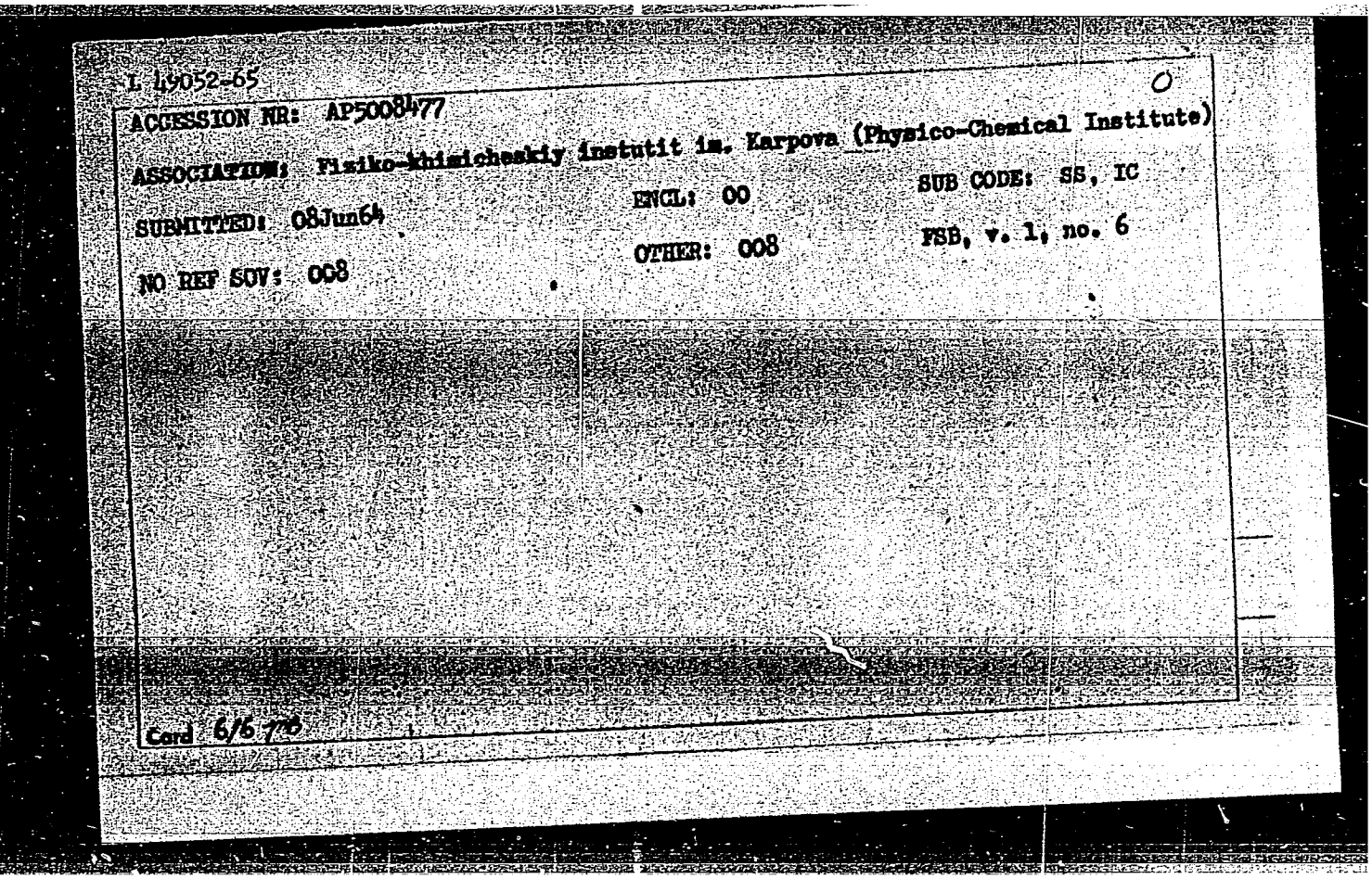
quoted American sources as having reported an electro-optic effect in $LiTaO_3$ single crystals. In fact, both American sources report no significant effect at direct current or 21 Mc/sec in the material produced by the Czochralski technique. Orig. art. has 3 figures and 1 table.

1 RSB, v. 1, no. 1, 1965, 30-32.
2 Shapiro, Z. I., S. A. Fedulov, and Yu. N. Venevtsev. Curie point of the ferroelectric $LiTaO_3$. Fizika tverdogo tela, v. 6, no. 1, 1964, 316-327.
3 Vaynshteyn, B. K. Present-day problems of crystallography. IN: Akademiya nauk SSSR. Vestnik, no. 6, 1963, 31-38.
4 Journal of Applied Physics, v. 29, no. 2, 1958, 233-234.
5 Geusic, J. E., S. K. Kurtz, L. G. Van Uitert, and S. H. Wemple. Applied Physics Letters, v. 4, no. 8, 1964, 141-143.
6 Peterson, G. E., A. A. Ballman, P. V. Lenzo, and P. M. Bridenbaugh. Applied Physics Letters, v. 5, no. 3, 1964, 62-64.
7 Ballman, A. A. Journal of the American Ceramic Society, v. 48, no. 2, 1965, 112-113

Card 5/6



L 49052-65

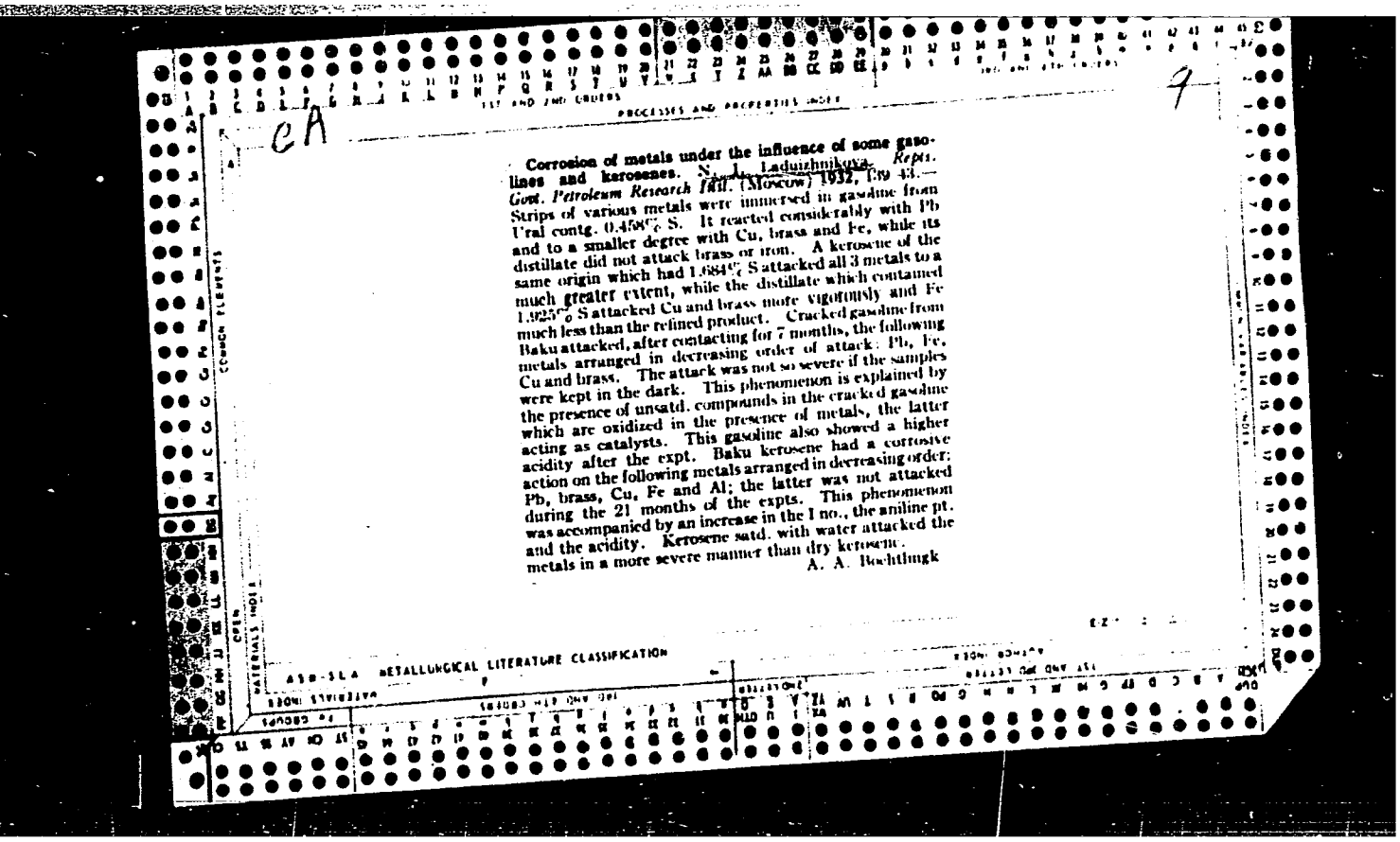
ACCESSION NR: AP5008477

ASSOCIATION: Fiziko-khimicheskiy institutit im. Karpova (Physico-Chemical Institute)

SUBMITTED: 08Jun64 ENCL: 00 SUB CODE: SS, IC

NO REF SOV: 008 OTHER: 008 FSB, v. 1, no. 6

Card 6/6

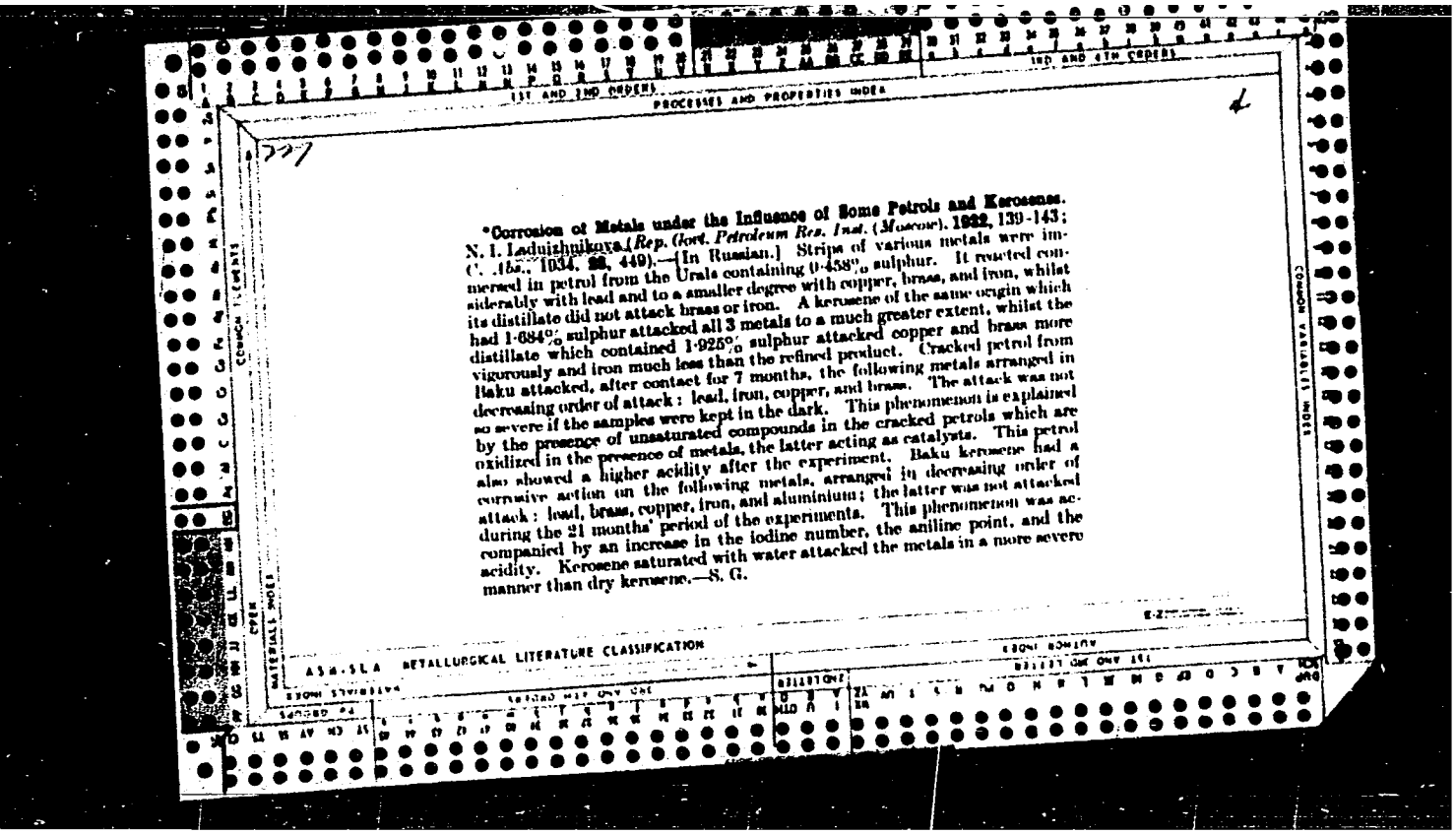


CA

Corrosion of metals under the influence of some gasolines and kerosenes. S. L. Ladurzhnikova. *Repts. Govt. Petroleum Research Inst.* (Moscow) 1932, 139 43.—Strips of various metals were immersed in gasoline from Ural contg. 0.458% S. It reacted considerably with Pb and to a smaller degree with Cu, brass and Fe, while its distillate did not attack brass or iron. A kerosene of the same origin which had 1.684% S attacked all 3 metals to a much greater extent, while the distillate which contained 1.925% S attacked Cu and brass more vigorously and Fe much less than the refined product. Cracked gasoline from Baku attacked, after contacting for 7 months, the following metals arranged in decreasing order of attack: Pb, Fe, Cu and brass. The attack was not so severe if the samples were kept in the dark. This phenomenon is explained by the presence of unsatd. compounds in the cracked gasoline which are oxidized in the presence of metals, the latter acting as catalysts. This gasoline also showed a higher acidity after the expt. Baku kerosene had a corrosive action on the following metals arranged in decreasing order: Pb, brass, Cu, Fe and Al; the latter was not attacked during the 21 months of the expts. This phenomenon was accompanied by an increase in the I no., the aniline pt. and the acidity. Kerosene satd. with water attacked the metals in a more severe manner than dry kerosene.

A. A. Bochthingk

A58-SL4 METALLURGICAL LITERATURE CLASSIFICATION



*Corrosion of Metals under the Influence of Some Petrols and Kerosenes. N. I. Laduizhnikova. (*Rep. Govt. Petroleum Res. Inst.* (*Moscow*). 1932, 139-143; *C. Abs.*, 1934, **28**, 449).—[In Russian.] Strips of various metals were immersed in petrol from the Urals containing 0·458% sulphur. It reacted considerably with lead and to a smaller degree with copper, brass, and iron, whilst its distillate did not attack brass or iron. A kerosene of the same origin which had 1·684% sulphur attacked all 3 metals to a much greater extent, whilst the distillate which contained 1·925% sulphur attacked copper and brass more vigorously and iron much less than the refined product. Cracked petrol from Baku attacked, after contact for 7 months, the following metals arranged in decreasing order of attack: lead, iron, copper, and brass. The attack was not so severe if the samples were kept in the dark. This phenomenon is explained by the presence of unsaturated compounds in the cracked petrols which are oxidized in the presence of metals, the latter acting as catalysts. This petrol also showed a higher acidity after the experiment. Baku kerosene had a corrosive action on the following metals, arranged in decreasing order of attack: lead, brass, copper, iron, and aluminium; the latter was not attacked during the 21 months' period of the experiments. This phenomenon was accompanied by an increase in the iodine number, the aniline point, and the acidity. Kerosene saturated with water attacked the metals in a more severe manner than dry kerosene.—S. G.